Revision number:

Purchasing Agent: David Gill
(801) 538-3254

Item: Traffic Signal Priority Premption Control System

Vendor: 29740H	Western Signal, Inc. 1500 W. Cedar Ave. Denver, CO 80223
Internet Homepage:	www.westernsignal.com
Telephone:	(303) 462-2530
Fax number:	(303) 462-2533
Contact:	Steve O'Connor
Email address:	westernsig@aol.com
Brand/trade name:	TOMAR Electronics
Price:	See attached price schedule (page 10)
Terms:	Net 30 days
Effective dates:	02/07/2005 through 02/06/2007
Days required for delivery:	15-30 days
Price guarantee period:	2 years
Minimum order:	N/A
Min shipment without charges:	
Other conditions:	Potentially renewable until 02/06/2010

THIS IS A NEW CONTRACT.

This contract resulted from bid GL5020

Also see MA1859

This contract covers only those items listed in the price schedule. It is the responsibility of the agency to ensure that other items purchased are invoiced separately. State agencies will place orders directly with the vendor (creating a PG in Finet) and make payments for the same on a PV referencing the original PG. Agencies will return to the vendor any invoice which reflects incorrect pricing.

BACKGROUND The Utah Department of Transportation (UDOT) has been installing traffic signal priority preemption control system for the past ten years. During the ten-year period, Opticom systems supplied by 3M and Strobecom II systems supplied by Tomar have been installed. These systems have been installed mainly in the Salt Lake, Weber, and Utah Counties. UDOT installs on the average of fifteen (15) systems yearly.

DETAILED SCOPE OF WORK

Traffic Signal Priority Preemption Control System: The system will consist of an optical emitter, optical receiver, optical detector cable, optical signal processor, and software.

1. System Description

1.1. The system shall utilize infrared encoded optical communications technology to process valid optical signals emitted from authorized vehicles, and place calls to traffic controller preempt inputs to effect preemption ("green lights") of normal traffic control signals.

1.2. Components of the system shall consist of infrared optical emitters mounted on authorized vehicles, infrared receivers mounted in the intersections and interfaced to traffic controllers via an optical signal processor.

1.3. Optical emitters shall emit infrared optical signals on both the industry standard high-priority carrier frequency 14.035 Hz (Emergency band), or the industry standard low-priority carrier frequency 9.639Hz (Transit band) by user selection. Additionally, emitters shall be capable of activating at least one unique vehicle identification code to the optical signal processor.

1.4. Receivers shall consist of infrared optical detectors, mounted to view the approaches to intersections, an optical signal processor (OSP) installed in the traffic control cabinet and wired to the preempt call inputs of the traffic controller, and detector cable connecting the optical detectors to the OSP.

1.5. As emitter equipped vehicles approach receiver equipped intersections, the optical detectors shall convert the incoming optical signal into an electronic signal. The OSP shall decode the electronic signal, delivered by the detector cable, determine the priority of the vehicle, arbitrate priority between any simultaneously approaching vehicles, place appropriate calls to controller inputs, and log vehicle detection events.

1.6. The OSP shall be capable of categorizing vehicle codes into priority subgroups within each signal band. The OSP shall be capable of the following actions, configurable on a per-subgroup basis:

1.6.1. Local preempt – If enabled, the OSP shall place a call on the appropriate controller input in response to vehicle detection. (Default shall be enabled)

1.6.2. Logging – If enabled, the OSP shall be capable of writing a log record in non-volatile memory consisting of but not limited to the following information: (Default shall be enabled)

1.6.2.1. Vehicle subgroup
1.6.2.2. Vehicle ID number
1.6.2.3. Signal band
1.6.2.4. Direction

1.6.2.5. Call duration
1.6.2.6. Final greens at end of call
1.6.2.7. Duration of final greens
1.6.2.8. Event start time and end time in real time
1.6.2.9. Event result codes. Each log consisting of one of the following result codes:

Reasons for termination of a preempt event
1.6.2.9.1 normal completion
1.6.2.9.2 max preempt time
1.6.2.9.3 overridden
1.6.2.9.4 max emitter time

Reasons why an event did not cause a preempt

1.6.2.9.5 priority too low
1.6.2.9.6 invalid code
1.6.2.9.7 out of range
1.6.2.9.8 subgroup disabled

1.6.3. Real-time announcement of vehicle detection – If enabled, the OSP shall send a short message via, RS-232 port upon the start vehicle detection processing. The message shall consist of the following information: (Default shall be disabled)

1.6.3.1. Vehicle subgroup
1.6.3.2. Vehicle ID number
1.6.3.3. Signal band
1.6.3.4. Direction

1.6.4. End of event echo – If enabled, the OSP shall echo the complete log record for a vehicle detection event immediately after the end of the event. The information included shall be those items enumerated in 1.6.2 above. (Default shall be disabled)

1.6.5. The phase selector shall have the capability to discriminate between individual ID codes and allow or deny a call output to the controller based on this information.

1.6.6 The phase selector shall have the ability to command an emitter to relay a received code to the next intersection.

1.7. System receivers shall always give precedence to emergency band vehicles over transit band vehicles.

1.8. System receivers shall be capable of detecting emitter-equipped vehicles at a range of up to 2,500 feet (762 meters), under clear atmospheric conditions.

1.9. System receivers shall interface with all NEMA TS-1 and TS-2 and Type 170&2070 traffic controllers equipped with programmable preemption routines, with no compromise to normal traffic controller functions.

2. System Components

2.1. Optical Emitter

2.1.1. Optical emitters shall generate the optical signal required to activate the receiver equipment in the intersection. The light pulses shall consist of a frequency base signal for standard preemption systems to transmit vehicle ID information.

2.1.2. Optical emitter power supplies shall be powered by the vehicle's electrical system. The emitter power supply input voltage shall range from 10 to 30VDC.

2.1.3. Optical emitters shall perform three functions:

2.1.3.1. The first function shall be to transmit the industry standard carrier frequency for Emergency band signals, (14.035 +/- 0.003Hz) or for Transit Band signals (9.639 +/- 0.003 Hz), which shall represent Code 0 to the optical signal processors.

2.1.3.2. The second function shall be to transmit a vehicle identification signal, added to the carrier frequency by modulation of the carrier frequency.

2.1.3.3. Optical emitters shall conduct self-diagnostics and display emitter status via a single indicator light located on the control switch.

2.1.4. Optical emitters shall operate over a temperature range of -67 °F (-55 °C) to +165 °F (+74 °C). The optical emitter shall operate over a range of 5% to 95% relative humidity.

2.1.5. The optical emitter shall have a cutout option, which shall be wired to a user provided switch to disable the emitter automatically when the vehicle is in park, or neutral.

2.2. Optical Detector

2.2.1 The required optical detector will be a lightweight and weatherproof device.

2.2.2 Infrared optical detectors shall sense optical emitter signals over an adjustable range of 200 feet (61m) to 2500 feet (762m) in optimum atmospheric conditions.

2.2.3. Infrared optical detectors shall transmit electrical signals to the optical signal processor via up to 1000 feet of optical detector cable.

2.2.4. The optical detector nominal conical field of view will allow for optical sensing for skewed approaches, slight curves, and 80-foot wide roadway at ranges given in section 2.2.2.

2.2.5. Infrared optical detectors shall operate over a range of 12 to 30 VDC and current of up to 50ma maximum.

2.2.6. Hardware shall be available from the manufacturer to allow mounting the optical detector to mast arm, span wire, and various other possible intersection mounting configurations.

2.2.7. The optical detector design shall include adjustable tubes to enable their reorientation for span wire mounting without disassembly of the unit.

2.2.8. The optical detector will accept optical signals from one or two directions and will provide single or dual electrical output signal(s).

a. Uni-directional with one output channel.

b. Bi-directional with one output channel.

c. Bi-directional with two output channels.

2.2.9. The optical detector will allow aiming of the two optical sensing inputs for skewed approaches or slight curves.

2.2.10The optical detector will have a built-in terminal block to simplify wiring connections.

2.3.Optical Detector Cable

2.3.1. The optical detector cable shall be compatible with the optical detector and optical signal processor supplied by the bidder. The optical detector cable shall deliver sufficient power from the phase selector to the optical detector and will deliver the necessary quality signal from the detector to the phase selector over a non-spliced distance of 1,000 ft (305m).

2.3.2. Optical detector cable shall be of durable construction to allow the following types of installation:

2.3.2.1. Direct-burial
2.3.2.2. Conduit and mast arm pull
2.3.2.3. Exposed (overhead, as with span wire.)

2.4. Optical Signal Processor

2.4.1. Optical signal processors shall be installed in the traffic controller cabinet to decode the electrical signals from optical detectors. The optical signal processor shall interface directly with California/New York Type 170/179 and newer 2070 series controllers with compatible software, and NEMA TS-1 and TS-2 with suitable system interface equipment and software.

2.4.2. Optical signal processors shall be powered from a nominal 120 VAC (95VAC to 135VAC), 60Hz mains and have an on board, regulated power supply that supports up to at least 10 optical detectors.

2.4.3. Optical signal processors shall be modular, plug and play in construction and come standard with the following:

2.4.3.1. Up to but not limited to four individual signal processor modules, each capable of receiving and decoding up to 10 coded emergency or transit band signals simultaneously.

2.4.3.2. An AC line-locked real-time clock module, that provides a battery backed up on board source for time and date stamp information during event logging. The real-time clock shall be read and set via the RS-232 port. Battery backup shall be rechargeable and provide a 1-week backup life with system power off.

2.4.3.3. A communication module, which shall arbitrate priority between the signal processor modules, logs events, and provide RS-232 communication with the outside world for system configuration during installation, and real time communication with the traffic controller or central system during operation.

2.4.3.4. Non-volatile memory shall be available for storage of configuration parameters and event logs. Retention time for the non-volatile memory module shall be a minimum of 10 days with system power off.

2.4.4. Optical signal processor front panel shall have the following features:

2.4.4.1. Power on/off switch with corresponding LED indicator.

2.4.4.2. LED indicators for emergency and transit band reception status for each of four channels.

2.4.4.3. Test switches for activating internal diagnostics.

2.4.4.4. Optical signal processors shall have a range arm switch for enabling the setting of detection range without software interface with the RS-232 port. All available channels and bands shall be able to be armed simultaneously for range setting.

2.4.4.5. Optical signal processors shall have and inter-module bus expansion connector which shall allow connection of additional optical signal processor modules and add-on system accessories.

2.4.4.6. Optical signal processors shall have an RS-232 and USB communications port.

2.4.4.7. Optical signal processors shall have a channel enable/disable switch with a status LED for each of 4 channels.

2.4.5. Programming the optical signal processor and retrieving data stored in it via the RS-232 port shall be accomplished using an IBM PC-compatible computer either locally or remotely via a modem.

2.4.6. The optical signal processor shall be capable of decoding 10,000 separate vehicle identification codes both in emergency and in transit band standard, expandable to 65,000 vehicle identification codes both in Emergency and in Transit bands, with maximum non-volatile memory installed.

2.4.7. Optical signal processors shall log and store in non-volatile memory, at least 1000 log events minimum, and be plug and play expandable to 15,000 event logs by adding an extended memory module. When the log is full, the oldest entry shall drop off to allow the newest entry to be logged.

2.4.8. Optical signal processors shall have a Max Call Timer, Call Extension Timer, and a Call Delay Timer in the software program for both Emergency and Transit Band.

2.4.9. Transit band vehicles shall have a set of green timers available for uniquely handling transit vehicle signal phase timing.

2.5. System Software

2.5.1. OSP configuration software shall be provided on CD-ROM. It shall run on IBM compatible computers with Windows 95, 98, NT 4.0, 2000 and Window XP software.

2.5.2. The software shall provide windows and menus for setting vehicle ID subgroups and codes, range settings for each individual emergency and transit vehicle subgroup, intersection and channel names, timing parameters, desired green signal indications during priority control operation, and for viewing and downloading logged information.

2.5.3. The software through the communication module will need to be able to communicate with UDOT's traffic signal central system, which is a Siemens ITS i2TMS system. The current communication system is an IP address system. The communication system will allow for upload/download of the data listed in section 2.5.2 to a central location with the manufacture software. The communication system will also allow the preemption status to be communicated to the i2TMS traffic signal system. Bidders may contact Peter Marshall at (801) 539-4789 for communication specification with the i2TMS. At this time the i2TMS does not have the software to communicate with the preemption device but the feature could be added at some future date.

3. Environmental

3.1. All Traffic Signal Priority Preemption Control Systems shall be designed to comply with the Operating Voltage, Operating Frequency, Power Interruption, Temperature and Humidity, Power Service Transients, Vibration and Shock requirements outlined in NEMA TS 2 (1998 or later) Environmental Requirements.

4. Additional Field Installation and Training Assistance

4.1 Additional Field Installation Assistance

4.1.1 The vendor will provide field installation assistance for the installation, maintenance, and operation of the traffic signal priority preemption control system. The person providing the assistance will not be expected to supply any equipment only assistance and documentation.

4.1.2 The daily rate for field installation assistance will include the following items: installer, subsistence, and travel expenses. The daily rate will for an eight (8) hour period. Authorization of field installation assistance must be in writing from the purchasing agency prior to providing the assistance.

4.2 Additional Training Assistance

4.2.1 The vendor will provide training assistance for the installation, maintenance, and operation of the traffic signal priority preemption control system. The person providing the training will be required to supply training equipment, training aides and documentation.

4.2.2 The daily rate for training assistance is to include the following items: trainer, training material, subsistence, and travel expenses. The daily rate will for an eight (8) hour period. Authorization of training assistance must be in writing from the purchasing agency prior to providing the training.

5. Responsibilities

5.1. The manufacturer or the manufacturer's representative shall provide responsive service before, during and after the initial installation of the Systems. If the purchasing agency demes additional installation assistance is needed the field installation assistance may be paid for at the field installation assistance daily rate.

5.2. The manufacturer or the manufacturer's representatives shall provide training to the system installer and maintenance department of the purchasing agency. Training shall consist of proper installation and operating procedures for the system hardware and software. If the purchasing agency demes additional training is needed the training may be paid for at the training assistance daily rate.

5.3. The manufacturer or the manufacturer's representative shall, at the request of the purchasing agency, assist with field surveys of the traffic system intersections to insure that all traffic control system equipment shall interface with the manufacturer's preemption system components. The necessary number of preemption channels and the appropriate location of the optical detectors, for optimum system operation shall be determined at this inspection.

5.4. The Manufacturers or the manufacturer's representative shall assist the installer or the purchasing agency's traffic department to insure that all traffic controllers are properly programmed for preemption system interface. Preemption system maintenance and operational manuals shall be provided to the purchasing agency and system installer.

5.5. The manufacturer shall warrant, provided the preemption system components have been properly installed, operated, and maintained, that matched system components that fail due to material flaws or workmanship shall be replaced or repaired under manufacturers published warranty provisions. The protection period against system component failure shall have a total duration of not less then 10 full years according to provisions set forth in the manufacturers published warranty.

5.6. The manufacturer shall provide, upon request, a certificate of product liability insurance for $5,000,000.

5.7. The manufacturer of the preemption system shall certify on request from the purchasing agency that all components in their system are designed, manufactured, and tested as a system of matched components of the latest design features and model, and shall meet or exceed the requirements of the specification.

5.8. The emitters and optical signal processors must be field programmable by the user, using the manufacturer's system software via computer.

Specific Clarifications:

Question:
1.6.6 - The phase selector shall have the ability to command an emitter to relay a received code to the next intersection - I just do not understand what they are asking if the vehicle is traveling in the direction of the next intersection the emitter will send a code.

Answer:
In some instances the next traffic signal in a line of traffic signals does not have a good line of sight from approaching emergency vehicle. This option ensures that those intersections with poor line of sight will receive a preemption call. When the detector get a preemption command from am emergency vehicle, the signal can be relayed to the intersection with poor line of sight. This requirement can be met by either the vendor supply a combination detector/emitter or install an emitter of the traffic signal to relay the signal.

Question:
2.2.7 - The optical detector design shall include adjustable tubes to enable their reorientation for span wire mounting without disassembly of the unit - This can only be done by 3M and even with the adjustment it is still less than a 2091-SD also why would you want to limit your view by extending the tube out.

Answer:
We are interest in having a detector that can be mounted on a span wire that does not require extensive modification of the traffic signal arm mounted detector. The adjustable tube can be modified to maximize the receiving signal from the emitter by either removing, shorting, or lengthen the tube.

Question:
2.2.8 - The optical detector will accept optical signals from one or two directions and will provide single or dual electrical output signals - This can only be done by 3M.

Answer:
The vender can either supply one detector that can receive signal in two directions or the vender can supply two detectors to meet this requirement.

Question:
2.2.9 - The optical detector will allow aiming of the two optical sensing inputs for skewed approaches or slight curves - Again this is a 3M spec.

Answer:
If the venders' detector does not have detector for skewed approaches or slight curves then a second detector may be required.

Question:
2.4.3 - OSP shall be modular, plug and play in construction and come standard with the following. - this is a Tomar spec.

Answer:
This may be a Tomar specification but we feel that other supplier could meet the specification.

Question:
2.4.4.6 - OSP shall have an RS-232 and USB communications port - Tomar does not offer USB comm ports and do not believe 3M does either.

Answer:
We are anticipating that our technicians will be using their new laptop computers to upload and download data while in the field. The new laptops do not have a RS-232 port only a USB port. We would just as soon not have to use an adaptor.

Question:
2.4.6 - This is a Tomar spec because 3M cannot expand to recognize all 65,000 codes. This is one of the points I tried to make that some agencies will be locked out just because they are not in the code range.

Answer:
Item 2.4.6 will be changed to read:
"The optical signal processor shall be capable to decoding 10,000 separate vehicle identification codes both in emergency and in transit band standards."

Question:
2.5.3 - We need to know if the i2TMS (ICONS) system has drivers written for communication to TOMAR's system.

Answer:
At this time i2TMS does not have drivers written to communicate with the TOMAR system.

PRICING

Item	Description	Yearly Qty	Unit	Unit Price
1	Optical Emitter	60	Each	$425.00
2	Optical Detector	30	Each	$430.10
3	Optical Detector Cable	10,000	Ln Feet	$ .32
4	Optical Signal Processor	15	Each	$1,658.70
5	Software	1	Lump Sum	No Charge
6	Additional Field Installation Assistance	10	Day	No Charge
7	Additional Training Assistance	5	Day	No Charge
8	E-Lock emitter authenticator system- for control cabinet			$1,900.00
9	E-Lock emitter authenticator system for emergency/authorized vehicle			$395.00
10	10% off list price for all items related to the Strobecom II system			

Note: Item 2-Optical Dector is for TOMAR's 2095-2 Dual Detector.
There is also offered a 2091-SD, single approach detector at $175.00

FINET COMMODITY CODE(S):
55080000000 – TRAFFIC CONTROLS AND EQUIPMENT, ELECTRIC SYSTEMS